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UNITED STATES DEPARTMENT OF AGRICULTURE
CONSUMER AND MARKETING SERVICE
WASHINGTON, D.C.



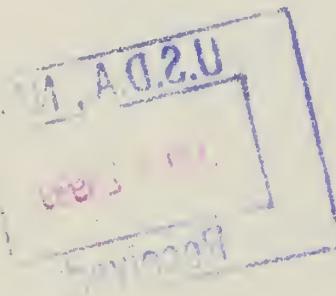
UNITED STATES
STANDARDS
for grades of
DEHYDRATED
GRAPEFRUIT JUICE



EFFECTIVE JULY 1, 1969

First Issue
As Amended

These standards supersede the standards
which have been in effect since
September 21, 1968



This is the first issue of the United States Standards for Grades of Dehydrated Grapefruit Juice as amended.

These standards have been in effect since March 19, 1956 (21 F.R. 1065, February 16, 1956).

Section 52.3031 was amended (22 F.R. 3535) to cite the Regulations Governing Inspection and Certification for ascertaining the grade of a lot, effective July 1, 1957. The standards amended in 1968 (33 F.R. 11881, August 22, 1968) raise the oil limits (Section 52.3028) and change the method for the determination of recoverable oil (Section 52.3030); amended May 17, 1969 (34 F.R. 7860).

These standards are included in the Code of Federal Regulations, Title 7 -- Agriculture, Part 52.

This grade standard is issued under authority of the Agricultural Marketing Act of 1946 which provides for the issuance of official U.S. grades to designate different levels of quality for the voluntary use of producers, buyers, and consumers. Official grading service is also provided under this Act upon request of the applicant and upon payment of a fee to cover the cost of the service.

As is the case of other standards for processed fruits and vegetables, these standards are designed to serve as a convenient basis for sales, for establishing quality control programs, and for determining loan values. They will also serve as a basis for the inspection of this commodity by Federal inspection service, which is available for the inspection of other processed products as well.

These standards are issued by the Department after careful consideration of all data and views submitted and the Department welcomes suggestions which might aid in improving these standards in future revisions. Comments may be submitted to, and copies of these standards obtained from:

Chief, Processed Products Standardization and Inspection Branch
Fruit and Vegetable Division, C&MS
U.S. Department of Agriculture
Washington, D. C. 20250

UNITED STATES STANDARDS FOR GRADES OF DEHYDRATED GRAPEFRUIT JUICE

Effective July 1, 1969

PRODUCT DESCRIPTION, STYLES, AND GRADES

Sec.

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- 52.3022 Styles of dehydrated grapefruit juice.
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LOT COMPLIANCE

- 52.3031 Ascertaining the grade of a lot.

SCORE SHEET

- 52.3032 Score sheet for dehydrated grapefruit juice.

AUTHORITY: §§ 52.3021 to 52.3032 issued under sec. 205, 60 Stat. 1090, as amended; 7 U. S. C. 1624.

PRODUCT DESCRIPTION, STYLES, AND GRADES

§ 52.3021 *Product description.* Dehydrated grapefruit juice is the product obtained from the juice of clean, sound, mature fruit of the grapefruit tree (*Citrus paradisi*), which juice has been concentrated in accordance with good commercial practice. The concentrate is dehydrated to a moisture content of not more than 3 percent, by weight. Cold-pressed grapefruit oil, or terpeneless or partially deterpened cold-pressed grape-

fruit oil, incorporated in a suitable edible carrier(s) such as sorbitol, glucose, or gum acacia, may be added to the product only in such amounts as to provide a proper grapefruit flavor to the reconstituted product. The product thus prepared is packaged in hermetically sealed containers with a proper desiccant to reduce the moisture content to approximately 1 percent, by weight, so as to assure preservation of the product. The sulfur dioxide content of the dehydrated grapefruit juice is not more than 250 p. p. m.

§ 52.3022 *Styles of dehydrated grapefruit juice.* (a) Style I (unsweetened) contains no added sweetening ingredient except as may be necessary to provide a carrier for grapefruit oil. The reconstituted juice of this style contains not less than 15 ounces (avoirdupois) of grapefruit solids per one gallon.

(b) Style II (sweetened) contains nutritive sweetening ingredients in excess of any amounts necessary to provide a carrier for grapefruit oil. Reconstituted juice of this style contains not less than 14 ounces (avoirdupois) of grapefruit solids per one gallon.

§ 52.3023 *Grades of dehydrated grapefruit juice.* (a) "U. S. Grade A" or "U. S. Fancy" is the quality of dehydrated grapefruit juice that has a porous open structure free from lumps or other signs of caking and which dissolves readily in water to produce a grapefruit juice that is reasonably characteristic in appearance to fresh grapefruit juice. The reconstituted juice possesses a very good color; is practically free from defects; possesses a good flavor; and scores not less than 85 points when scored in accordance with the scoring system outlined in this subpart.

NOTE:

Compliance with the provisions of these standards shall not excuse failure to comply with the provisions of the Federal Food, Drug, and Cosmetic Act or with applicable State laws and regulations.

(b) "U. S. Grade B" or "U. S. Choice" is the quality of dehydrated grapefruit juice that has a reasonably porous open structure free from lumps and which dissolves reasonably readily in water to produce a grapefruit juice that is fairly characteristic in appearance to fresh grapefruit juice. The reconstituted juice possesses a good color; is reasonably free from defects; possesses a reasonably good flavor; and scores not less than 70 points when scored in accordance with the scoring system outlined in this subpart.

(c) "Substandard" is the quality of dehydrated grapefruit juice that fails to meet the requirement of U. S. Grade B or U. S. Choice.

FACTORS OF QUALITY

§ 52.3024 *Ascertaining the grade*—
(a) *General*. In addition to considering other requirements outlined in the standards, the following quality factors are evaluated:

- (1) *Factors not rated by score points*.
 - (i) Physical condition.
 - (ii) Faculty of dissolving in water.
- (2) *Factors rated by score points*. The relative importance of each factor which is scored is expressed numerically on the scale of 100. The maximum number of points that may be given each such factor is:

Factors:	Points
Color	40
Defects	20
Flavor	40
 Total score	100

§ 52.3025 *Ascertaining the rating for the factors which are scored*. The essential variations within each factor which is scored are so described that the value may be ascertained for such factors and expressed numerically. The numerical range within each factor which is scored is inclusive. (For example: "17 to 20 points" means 17, 18, 19, or 20 points.) The rating is ascertained immediately after the product has been reconstituted.

§ 52.3026 *Color*—
(a) *(A) classification*. Dehydrated grapefruit juice of which the reconstituted juice possesses a very good color may be given a score of 34 to 40 points. "Very good color" means

that the color is bright and typical of fresh grapefruit juice.

(b) *(B) classification*. If the reconstituted juice possesses a good color a score of 28 to 33 points may be given. Dehydrated grapefruit juice that falls into this classification shall not be grade above U. S. Grade B or U. S. Choice regardless of the total score for the product (this is a limiting rule). "Good color" means that the color is typical of fresh grapefruit juice which may be slightly dull but is not off-color.

(c) *(SSd.) classification*. If the reconstituted juice fails to meet the requirements of paragraph (b) of this section a score of 0 to 27 points may be given and the product shall not be graded above Substandard regardless of the total score for the product (this is a limiting rule).

§ 52.3027 *Defects*—
(a) *General*. The factor of defects refers to the degree of freedom from seeds or portions thereof, pulp, dark specks, improperly reconstituted material, or other defects that affect the appearance or drinking quality of the reconstituted juice.

(b) *(A) classification*. Dehydrated grapefruit juice of which the reconstituted juice is practically free from defects may be given a score of 17 to 20 points. "Practically free from defects" means that the appearance and drinking quality of the juice is not affected by defects.

(c) *(B) classification*. If the reconstituted juice is only reasonably free from defects a score of 14 to 16 points may be given. Dehydrated grapefruit juice that falls into this classification shall not be graded above U. S. Grade B or U. S. Choice regardless of the total score for the product (this is a limiting rule). "Reasonably free from defects" means that the appearance and drinking quality of the juice is not materially affected by defects.

(d) *(SSd.) classification*. Dehydrated grapefruit juice that fails to meet the requirements of paragraph (c) of this section may be given a score of 0 to 13 points and shall not be graded above Substandard regardless of the total score for the product (this is a limiting rule).

§ 52.3028 Flavor.

(a) (A) *classification.* Dehydrated grapefruit juice of which the reconstituted juice possesses a good flavor may be given a score of 34 to 40 points. "Good flavor" means that the flavor is a fine, distinct grapefruit juice flavor typical of properly processed canned grapefruit juice; is definitely free from terpenic, caramelized, oxidized, and rancid flavors; is free from off flavors; and the reconstituted juice meets the following requirements for the respective style:

- (1) Recoverable oil—not less than 0.011 nor more than 0.017 ml. per 100 ml.
- (2) Acid—not less than 0.85 gram per 100 grams.

(3) Brix—acid ratio for the respective styles:

- (i) Style I (unsweetened)—not less than 8 to 1 nor more than 14 to 1;
- (ii) Style II (sweetened)—not less than 11 to 1 nor more than 14 to 1.

(b) (B) *classification.* If the reconstituted juice possesses a reasonably good flavor a score of 28 to 33 points may be given. Dehydrated grapefruit juice that falls into this classification shall not be graded above U.S. Grade B or U.S. Choice regardless of the total score for the product (this is a limiting rule). "Reasonably good flavor" means that the flavor is reasonably typical of properly processed canned grapefruit juice which is free from abnormal and off-flavors of any kind; and the reconstituted juice meets the following requirements for the respective style:

- (1) Recoverable oil—not less than 0.009 nor more than 0.025 ml. per 100 ml.
- (2) Acid—not less than 0.70 gram per 100 grams.

(3) Brix-acid ratio for the respective styles:

- (i) Style I (unsweetened)—not less than 7 to 1 nor more than 14 to 1;
- (ii) Style II (sweetened)—not less than 11 to 1 nor more than 14 to 1.

(c) (SSd.) *classification.* Dehydrated grapefruit juice that fails to meet the requirements of paragraph (b) of this section may be given a score of 0 to 27 points and shall not be graded above U. S. Grade B or U. S. Choice regardless

of the total score for the product (this is a limiting rule).

EXPLANATIONS AND METHODS OF ANALYSES

§ 52.3029 *Definition of terms.* (a) "Reconstituted juice" means the product obtained by dissolving an entire package of dehydrated grapefruit juice in water to make the volume of grapefruit juice specified in directions for preparation.

(b) "Dissolves readily" means that (1) the product dissolves readily in the prescribed amount of cold water with only a reasonable amount of stirring, (2) the fruit particles rehydrate readily and (3) there is no material separation of colloidal or suspended matter.

(c) "Dissolves reasonably readily" means that (1) the product may require considerable stirring to dissolve the solids, (2) fruit particles may rehydrate only reasonably readily, and (3) there is no material separation of colloidal or suspended matter.

(d) "Acid" means the percent, by weight, of acid (calculated as anhydrous citric acid) in the reconstituted grapefruit juice and is determined by titration with standard sodium hydroxide solution using phenolphthalein as indicator.

(e) The "Brix" of the reconstituted juice means the degree Brix as determined by the Brix hydrometer calibrated at 20 degrees centigrade (68 degrees Fahrenheit) and to which any applicable temperature correction has been applied.

§ 52.3030 *Methods of analyses.* (a) "Recoverable oil" is determined by the following method:

METHOD

(1) Reagents.

Standard bromide-bromate solution—prepared and standardized to 0.099N in accordance with Chapter 42, Standard Solutions in the current edition of the AOAC.¹ For use, add 1 volume of standard solution to 3 volumes of water to make 0.0247N solution. 1 ml. of 0.0247N solution supplies bromine to react with 0.00085g., or 0.0010 ml., of *d*-limonene. The solutions are stable for 6 months.

¹ "AOAC" refers to the Official Methods of Analysis published by the Association of Official Analytical (formerly Agricultural) Chemists. Copies may be obtained from this Association at Box 540, Benjamin Franklin Station, Washington, D.C. 20044.

2-Propanol—Reagent grade ACS (American Chemical Society).

Dilute hydrochloric acid—prepared by adding 1 volume of concentrated acid to 2 volumes of water.

Methyl orange indicator—0.1 percent in water.

(2) **Apparatus.**

Electric heater—with recessed refractory top, 500-750 watts.

Still, all glass—500 ml. distillation flask with 24/40 standard taper neck; 200 mm. Graham condenser with 28/15 receiving socket and drip tip; connecting bulb and adapter as shown in Figure 1.

Burette—10 ml. or 25 ml. graduated to 0.1 ml., with easily controllable flow to permit both rapid and dropwise titration.

(3) **Determination.**

(i) Pipette 25 ml. of well-mixed sample (juice or reconstituted juice) into the distillation flask containing carborundum chips or glass beads, and add 25 ml. of 2-Propanol.

(ii) Distill into a 150 ml. beaker. Continue distilling until solvent ceases to reflux then remove the flask from the heater.

(iii) Add 10 ml. of dilute hydrochloric acid and 1 drop of indicator. (An alternative method would be to prepare a solution containing 5 ml. of indicator and 1,000 ml. of dilute hydrochloric acid—then add 10 ml. of this acid-indicator mix to the 150 ml. beaker.)

(iv) Titrate with the dilute bromate solution while stirring. The major portion of the titrant may be added rapidly, but the endpoint must be approached at about 1 drop per second. Disappearance of color indicates the endpoint.

(v) Determine the reagent blank by titrating three separate mixtures of 25 ml. 2-Propanol and 10 ml. of dilute hydrochloric acid with indicator—without refilling the burette. Divide the total milliliters of titrant used by three to obtain the average blank. Subtract the average blank thus obtained from the milliliters of titrant used to titrate the distillate.

(vi) Multiply the remainder by 0.004 to obtain the percent recoverable oil by volume in the juice sample.

(b) The "moisture content" of the dehydrated grapefruit juice is determined as follows:

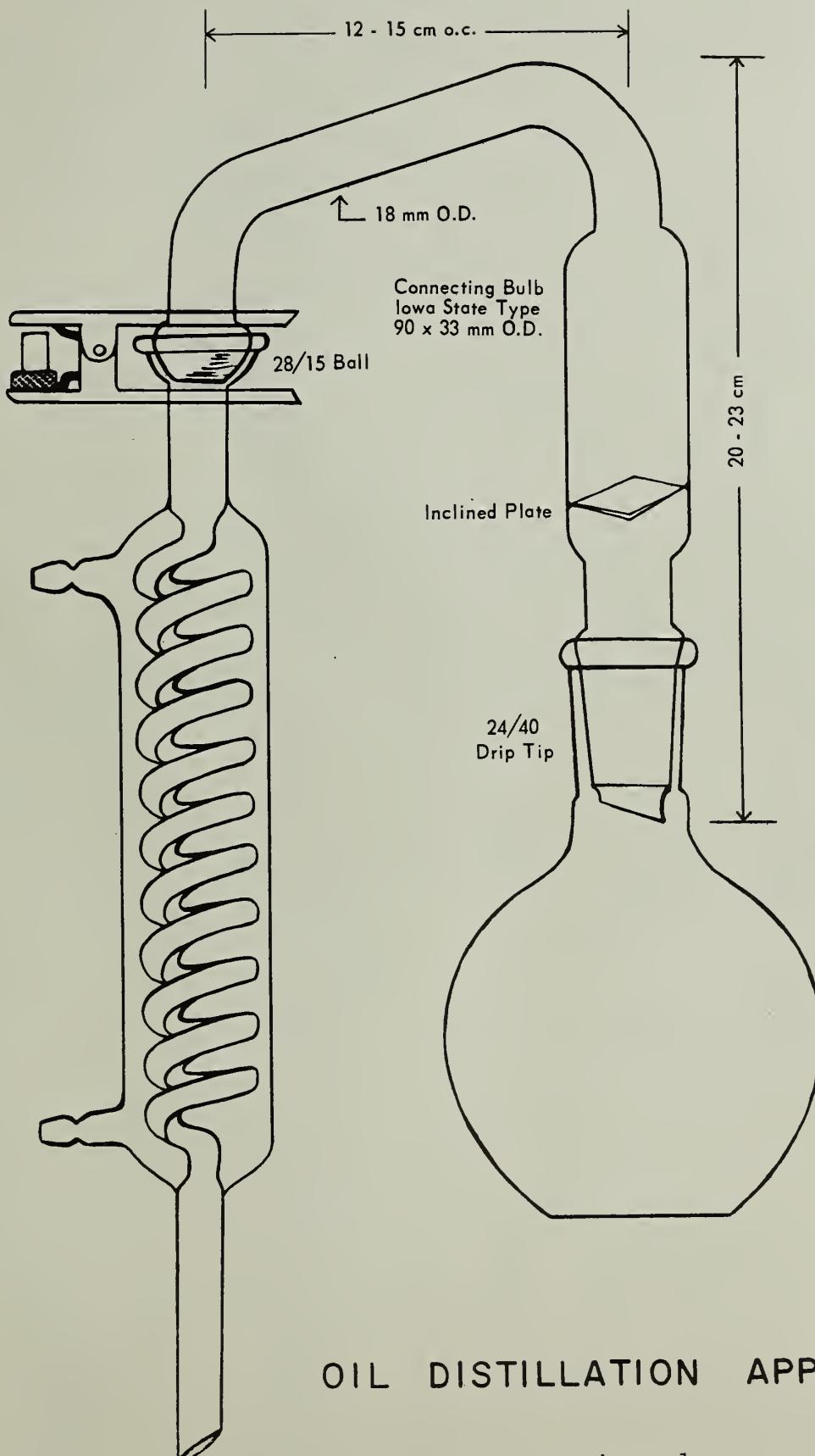
(1) A 3- to 5-gram sample is weighed into an aluminum weighing dish 1½ to 2 inches in diameter, having a tight-fitting cover. The samples are dried in a vacuum oven for 30 hours at a temperature of 60 degrees centigrade (140 degrees Fahrenheit) and a pressure not exceeding 100 mm of mercury. During the drying period air is passed through M_2SO_4 and admitted through the release cock at the rate of approximately 2 bubbles per second. At the end of the drying period the dishes are removed from the oven, the covers are placed on immediately and the dishes allowed to cool in a desiccator prior to final weighing. Sampling and weighing is carried out as rapidly as possible under low humidity conditions. The moisture content of the dehydrated grapefruit juice may be determined by any other method which gives equivalent results.

(c) The "sulfur dioxide" content of the dehydrated grapefruit juice is determined by the Monier-Williams method for total sulfurous acid in foods in accordance with the Official Methods of Analysis of the Association of Official Agricultural Chemists, using a 50-gram sample of the dehydrated grapefruit juice.

LOT COMPLIANCE

§ 52.3031 Ascertaining the grade of a lot.

The grade of a lot of dehydrated grapefruit juice covered by these standards is determined by the procedures set forth in the Regulations Governing Inspection and Certification of Processed Fruits and Vegetables, Processed Products Thereof, and Certain Other Processed Food Products (§§ 52.1 to 52.87).



OIL DISTILLATION APPARATUS

Figure 1



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SCORE SHEET

§ 52.3032 Score sheet for dehydrated grapefruit juice.

Size and kind of container.....	
Container mark or identification.....	
Style.....	
Label (including dilution factor).....	
Net weight.....	
Moisture content.....	
Brix of the reconstituted juice.....	
Anhydrous citric acid.....	
SO ₂ concentration.....	
Brix-acid ratio.....	
Recoverable oil (ml./100 ml.).....	
Reconstitutes properly (Yes) (No).....	

Factors	Score points
Color.....	40
Defects.....	20
Flavor.....	40
Total score.....	100

Grade.....	
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¹ Indicates limiting rule.

Effective date. The amendments to each affected grade standard shall become effective on July 1, 1969.

(Secs. 202-208, 60 Stat. 1087, as amended; 7 U.S.C. 1621-1627)

Dated: May 12, 1969.

JOHN E. TROMER,
Acting Deputy Administrator,
Marketing Services.

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Section 52.3031 amended July 1, 1957 (22 F.R. 3535)

Sections 52.3028 and 52.3030 amended August 22, 1968 (33 F.R. 11881)

Section 52.3028 amended May 17, 1969 (34 F.R. 7860)